means a correct one, as all the face moulds obtained by the method are simply segments of a circle, when every stair-builder knows that an inclined cut through a cylinder must produce a section whose outline is purely elliptical, having no part of a circle in it. It is this particular difference between the Sectorian and other systems that our correspondents find fault with. We admit the correctness of their views on the subject, and are aware that sometimes it is better not to preach at all than to preach from false premises ; but in this case we act on the principle that a "little knowledge is better than being without ;" and as the "Sectorian System" has its admirers, we consider it our duty to publish it.

It is not claimed for this system that it is better or more accurate than any other, but it has been found so easy of application that, for mechanics who have not the time to study or ability to acquire the more correct but more intricate methods, this will be found an expedient to fall back on. In fact, the "Sectorian System" is a kind of systematized rule of thumb method of obtaining the wreath of a hand-rail by the "cut and fit" process.

The earnest student, as a matter of course, will not rest content with a knowledge of this system only ; he will soon discover its imperfections, and will perhaps abandon it and study some other, but the knowledge acquired will always be of service in reading a new system.

We wish it understood that we publish this system on its own merits ; but we do say, that while it is not absolutely correct, it is very simple and very plain.

THE design for an altar promised last month has been unavoidably left over, but will appear in our next issue.

MR. ROBERT RIDDELL, author of "New Elements of Hand-Railing," "The Practical Carpenter and Joiner," "Artisan," etc., has consented to contribute a number of papers to the WOOD-WORKER on mechanical subjects, the first of which will appear in our May issue.

Mr. Riddell is known by every carpenter and stair-builder where the English language is spoken, and we are sure the majority of our readers will hail with pleasure his appearance in our columns. It may not be amiss to state right here that Mr. Riddell, having himself been a workman, is in full sympathy with the man who toils at the bench, and this, added to his profound knowledge of constructive art, makes him very popular among skilled workmen.

THE building trades in New York City are looking up. Carpenters and joiners seem to be pretty well employed, and occasionally advertisements for skilled workmen are seen in the daily press, which is a sure indication of briskness. Indeed, permits for new buildings and alterations have been given during the last month amounting to over one million of dollars ; and this is a large sum, when we consider that it is not to be frittered away on marble palaces or brown stone fronts. Good news is received also from Boston, Philadelphia, Chicago, and Baltimore. Wages are still pretty low, and we are afraid it will be some time before an increase takes place among wood-workers.

Although there is an evident dulness in the car-building trade, there is no reason to be discouraged, for, judging from appearances, there is likely soon to be a large foreign trade in car material of all kinds. One car-building company in Detroit is building eight palace sleeping cars, which are to embody all the latest improvements. Four of these are for the London and Great Northern Railway, England, and four for the New York, Lake Erie and Western. The cost will average about $14,000 each.

The latest novelty in the way of Pullman cars is that of "palace hunting cars," four of which are about to be built. They are intended for the accommodation of parties of hunters who want to go West for game, and they will contain sleeping apartments, a cook-room, a smoking-rooom, a kennel for hunting dogs, and a place in which to store game and guns.

The furniture trade is not unusually brisk, but there are evident signs of improvement, however, and with a revival in other branches of trade it will soon show increased activity.

Practical Carpentry.

THERE are many other ways of describing figures closely resembling ellipses, but we think we have shown enough to start the student fairly on his way. It is not our intention, as we stated in the opening chapter, to introduce any thing in these papers that will be beyond the comprehension of the ordinary skilled workman, therefore we shall have nothing to say of the higher curves at present, but may, as the student advances, describe their nature and uses in connection with practical carpentry.

We will now proceed to describe the mode of constructing Gothic arches, such as the carpenter will frequently have to make centres and frames for. These are the equilateral, the lancet, the drop arch drawn from two centres, and the four-centred and ogee arch drawn from four centres.

The equilateral arch is constructed on the

equilateral triangle A B C, Fig. 1, Plate 30, C and A being respectively the centres of the arcs A B, C B. For the lancet arch, bisect the width A B, Fig. 2, in *c*, and produce A B indefinitely to D and E; from A and B, with the radius A C, describe semicircles cutting A B in D and E, the centres from which the arcs are to be described. Let A C, Fig. 3, be the width, and D B the height of the arch; join A B, C B, and bisect the lines A B, C B, and draw through the points of bisection the perpendiculars *g f* and *h e*, meeting the line A C produced in *e* and *f*. From the points *e* and *f*, with the radius *f* A, or *e* C, describe the arcs A *g* B, C *h* B.

To form the drop arch, join A B, Fig. 4, and C B as before, and bisect them; and through the points of bisection draw perpendiculars, cutting A C in *e* and *f*, which two points are the centres of the arcs A B, B C. To describe a four-centred Gothic arch, divide the width of the arch A B, Fig. 5, into four equal parts in *e g f*. Draw A C, B D, perpendicular to A B, and from the points A and B, with the radius A B, describe the arcs A D, B C. Join D *e*, C *f*, and produce the lines to *h* and *k*. Then the points *e* and *f* are the centres of the arcs A *h*, B *k*, and the points C and D of the arcs *h l*, *k l*. The height of the arch in this example is $\frac{2}{3}$ of its span.

For a flatter arch proceed as follows:

Divide A B, Fig. 6, into four equal parts in *e*, *g*, *f*, and draw the perpendiculars A C, B D; from the points *e* and *f*, with the radius *e f*, describe the arcs *e h*, *f h* intersecting at *h*, and through the point of intersection draw *e h*, *f h*, and produce the lines both ways to *k* and D, and *l* and C respectively. Then from the points *e* and *f*, with the radius *e* A, describe the arcs A *k*, B *l*; and from the points C and D, with the radius C *l*, describe the arcs *l m*, *k m*. The height of the arch is $\frac{3}{5}$ of the span.

In Fig. 7 the centres of the arcs A *k*, B *l*, are found as before, by dividing A B into four equal parts, in *e*, *g*, *f*, and letting fall the perpendiculars in this case, not from the extremities of the line A B as before, but from the centres *e* and *f*. From these, then, let fall the perpendiculars *e* C, *f* D, to meet the lines *e h* and *f*, *h*, produced when C and D become the centres of the arcs *k m*, *l m*.

The arch, Fig. 8, is still flatter than the last. The line A B is divided into four equal parts in *e*, *g*, *f*; then from the centres A and B, with the radius A *f*, the arcs *e h*, *f h* are described, and through the point of their intersection the lines *e h*, *f h* are drawn and produced until they meet perpendiculars let fall from *e* and *f*. The arcs A *k*, B *l* are described from *e* and *f*, with the radius A *e*, and the arcs *k m*, *l m* from D C, with the radius D *k*. The height is $\frac{1}{3}$ of the span.

This style of arch can also be constructed as follows: Divide the line A B, Fig. 9, into six equal parts, in the points *e*, *g*, *h*, *k*, *f*. From *e* and *f* let fall the perpendiculars *e* C, *f* D; from the points A and B, with the radius A B, describe the arcs B C, A D, cutting the perpendiculars *e* C, *f* D, in C and D. Draw D *e l*, C *f m*. Then *e* and *f* are the centres of the arcs A *l*, B *m*, and C and D the centres of the arcs *m n*, *l n*. The height of the arch is, like the last, $\frac{1}{3}$ of the span.

To make the crown still flatter than the last figure, proceed as before for the centres of the haunch arches, by dividing A B, Fig. 10, into six equal parts, in *e*, *f*, *g*, *h*, *k*; draw A *m*, B *n*; then from the centres of these arches *e k*, with the distance between them as radius, describe the arcs *e l*, *k l*, and through *l* draw the lines *e l*, *k l*, produced to meet the perpendiculars let fall from *e* and k, in C D. Then the points C and D are the centres of the arcs *m o*, *n o*.

(*To be continued.*)

Isometric Projection.

We will now explain a method of projecting isometrical circles by means of scales. Draw two lines, *a b*, *b c*, Fig. 1, Plate 31, at right angles, *a c* being equal to *a b*. Take the distance *c a* in the compasses, and set off this distance from the point *a* to the point *d* on the line *a c* produced. Divide *a d*, *a b*, into the same number of equal parts, each of which may represent feet or inches. All isometrical projections of circles being ellipses, the major and minor axes will be found on this scale. Thus, if the distance *a d*—which we suppose to be 11 inches—represents the true diameter of the circle to be projected, then the distance *d b* will be the major axis, and *a b* or *a c* the minor axis of the ellipse or isometrical projection of the circle. The following is a method of using this scale in Fig. 2: Let the line *a b*, Fig. 4, represent the diameter of the circle of which an isometrical projection is required; and suppose, further, that the circle is required to be delineated horizontally, or on the face of the upper plane of a cube, as in Fig. 4. Take the distance *a b*, Fig. 4, in the compasses, and lay it on the line *a d*, Fig. 2, from the point *a*, so as to ascertain the length of it as indicated in the scale. It will in the present case be found to be 8 inches or 8 feet, as the case may be. Take half the distance between the point in the line *a c* and 8 in the line *a b* (which can be done by joining them by diagonal), and set off this from the point *c*, Fig. 4, to the points *d e* on the line *d c e*, which represents the major axis of the ellipse to be constructed. Through the point *c* draw a line *g f* at right angles to *d c e*. Take the distance of four divisions from *a b*, Fig. 2, and set them off

PLATE 30.

FIG. 1

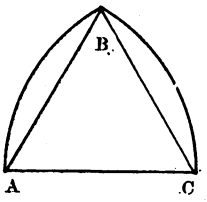

FIG. 2

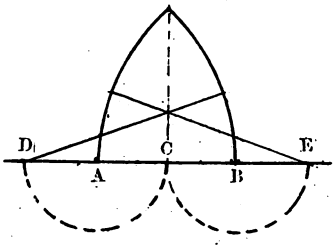

FIG. 3

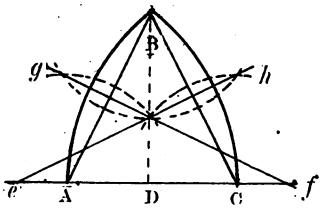

FIG. 4

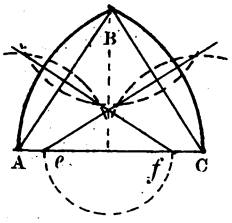

FIG. 5

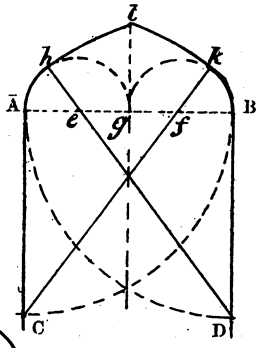

FIG. 6

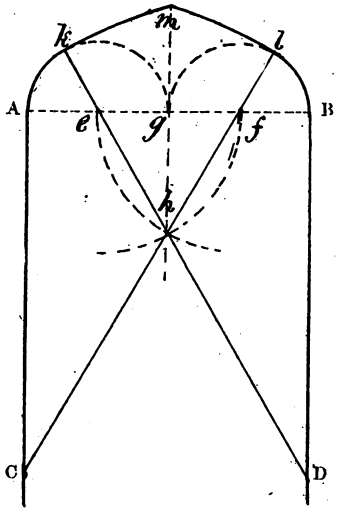

FIG. 7

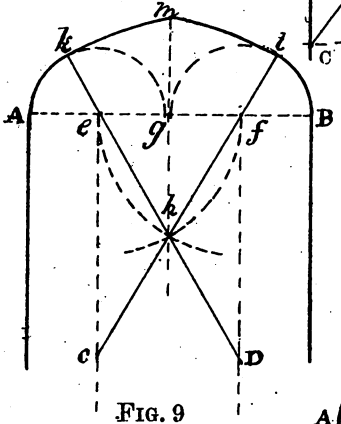

FIG. 8

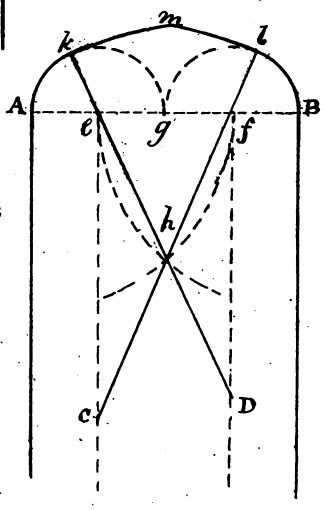

FIG. 9

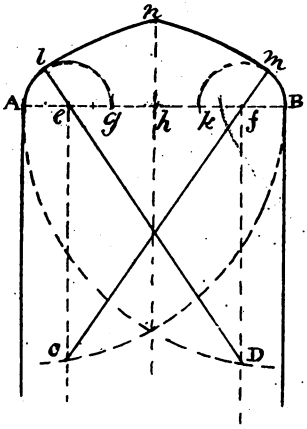

FIG. 10